

Date: Sat, 20 Nov 93 04:30:26 PST
From: Ham-Homebrew Mailing List and Newsgroup <ham-homebrew@ucsd.edu>
Errors-To: Ham-Homebrew-Errors@UCSD.Edu
Reply-To: Ham-Homebrew@UCSD.Edu
Precedence: Bulk
Subject: Ham-Homebrew Digest V93 #108
To: Ham-Homebrew

Ham-Homebrew Digest Sat, 20 Nov 93 Volume 93 : Issue 108

Today's Topics:

 Electronic Keyer Kit
 Lo-Fer, Med-Fer, Hi-Fer (have questions, need elmer)
 single sideband
 single sideband, phasing and T2/R2
 single sideband generation
 Xtal filter help.
 Yes, someone has built a T2 and R2

Send Replies or notes for publication to: <Ham-Homebrew@UCSD.Edu>
Send subscription requests to: <Ham-Homebrew-REQUEST@UCSD.Edu>
Problems you can't solve otherwise to brian@ucsd.edu.

Archives of past issues of the Ham-Homebrew Digest are available
(by FTP only) from UCSD.Edu in directory "mailarchives/ham-homebrew".

We trust that readers are intelligent enough to realize that all text
herein consists of personal comments and does not represent the official
policies or positions of any party. Your mileage may vary. So there.

Date: Sat, 13 Nov 1993 02:21:54 GMT
From: dog.ee.lbl.gov!agate!doc.ic.ac.uk!pipex!sunic!psinntp!psinntp!gdstech!
gdstech!bat@network.ucsd.edu
Subject: Electronic Keyer Kit
To: ham-homebrew@ucsd.edu

A few years ago, there was an article in QST about the CMOS Super
Keyer II. I bought the kit from Idiom Press, and put it together in
a few hours. It's a 1 chip microprocessor, and you just add some
resistors, switches, a pot and battery holder. Works great.
It has 4 memory positions, and is controlled by Morse commands
on the paddles. Speeds from 6 to 60 on the pot. Works great
in contests, and batteries last for years. Send a sase to Idiom
Press at Box 683, Deerfield, Ill, 60015 for info.

--

* Pat Masterson D12-25 | KE2LJ@KC2FD *

* Grumman Data Systems | 516-346-6316. *

* Bethpage, NY 11746 | bat@gdstech.grumman.com *

Date: Tue, 16 Nov 1993 04:16:14 GMT
From: usc!howland.reston.ans.net!usenet.ins.cwru.edu!nshore!fmsystem.telemex.com!
andrews@network.ucsd.edu
Subject: Lo-Fer, Med-Fer, Hi-Fer (have questions, need elmer)
To: ham-homebrew@ucsd.edu

Hello all,

Could somebody send me the tech info on the 'Fers' and the rules
and reg's???

Better yet, start a new thread...

--

Tell Me Something I Don't Know,	! HAM =	N80FS
Show Me Something I Can Use,	! ARMY MARS =	AAN5HJT
Push The Buttons,	! CB =	THE NEON KNIGHT
Connect The God-Damn Dots!!! - Ministry	! HACKER =	TH3 N30N KN16Ht

Date: Fri, 19 Nov 93 15:24:46 GMT
From: netcomsv!netcomsv!bongo!skyld!jangus@decwrl.dec.com
Subject: single sideband
To: ham-homebrew@ucsd.edu

In article <1993Nov17.084428.27117@ke4zv.atl.ga.us> gary@ke4zv.atl.ga.us writes:

> Of course there was a solution back in vacuum tube days. It was called
> a 7360. This was a high level beam deflection mixer used in SSB transmitters.
> The problem of getting a precise 90 degree phase shift across three octaves
> of audio remained, however, with the B&W Mod 350 2Q4 network only good
> for +/- 1.5 degrees across the bandpass. That only gave about 40 db of
> opposite sideband rejection, but carrier suppression was easily 60 db.

Yup, and the Gonset GSB-100 was a classic adaptation of this. Complete with
a surplused Command set (ARC-5) Transmitter VFO for the main tuning. It was
with one of these transmitters I found out how long an RF burn takes to heal.

Amateur: WA6FWI@WA6FWI.#SOCA.CA.USA.NA | "It is difficult to imagine our
Internet: jangus@skyld.tele.com | universe run by a single omni-

US Mail: PO Box 4425 Carson, CA 90749 | potent god. I see it more as a
Phone: 1 (310) 324-6080 | badly run corporation."

Date: 19 Nov 93 02:29:54 GMT
From: psinntp!arrl.org@uunet.uu.net
Subject: single sideband, phasing and T2/R2
To: ham-homebrew@ucsd.edu

In rec.radio.amateur.homebrew, gary@ke4zv.atl.ga.us (Gary Coffman) writes:

>
>There's a real simple way to get a 90 degree shift. Have your oscillator
>drive a divide by four circuit arranged as one JK driving two other JKs,
>one driven by Q and the other driven by not Q. You can take your quadrature
>components from the latter pair of FFs. Of course your oscillator must
>run at 4X the IF frequency, but that's not a problem. If you use HS parts
>for the JKs, your quadrature outputs will be nearly ideal square waves
>which is exactly what you want to drive diode ring mixers efficiently.

I tried flip flops with a 160 meter phasing receiver many years ago.
It sort of worked, but after doing some calculations, realized that
you need really *fast* flip flops to get an accurate 90 degree
phase shift. It probably isn't a problem at 160 kHz with fast logic
devices, though. On 440 MHz, good luck...

>
>Getting that blankety blank audio phase shift to be exactly 90 degrees
>at every frequency over a 3 octave range is still the hard part.

My perspective on this is different. With computer modeling, I think
you can get an extremely good idea what the phase shift will be at
audio frequencies. Thus, I had no difficulty modeling my circuit and
building something that closely approximated my model. Figuring out
the expected error isn't too difficult, either. On the other hand,
try and calculate the expected amplitude error through the mixer and
amplifiers vs. frequency.

Zack Lau KH6CP/1

Internet: zlau@arrl.org "Working" on 24 GHz SSB/CW gear
Operating Interests: looking for state
#9 on 10 GHz
US Mail: c/o ARRL Lab
225 Main Street Station capability: QRP, 1.8 MHz to 10 GHz
Newington CT 06111 modes: CW/SSB/FM/packet....
Phone (if you really have to): 203-666-1541

Date: 19 Nov 93 20:28:08 GMT
From: ogicse!uwm.edu!cs.utexas.edu!howland.reston.ans.net!usenet.ins.cwru.edu!
slc6!trier@network.ucsd.edu
Subject: single sideband generation
To: ham-homebrew@ucsd.edu

In article <CGr8My.8n2@srgenprp.sr.hp.com>, Alan Bloom <alanb@sr.hp.com> wrote:
>DSB suppressed carrier is a perfectly viable method that is indeed
>compatible with SSB receivers. There are two main problems:

My understanding (from book larnin', not experience) is that there's an additional problem: DSBSC didn't work well with direct-conversion SSB receivers. Apparently that it is hard to tune the receiver because it will pick up both sidebands. Unless tuned very precisely, the two signals will tend to interfere and cause hard-to-understand output.

Is this correct? How much of a problem is it in reality?

Stephen

--

Stephen Trier KB8PWA "The light at the end of the tunnel
Work: trier@ins.cwru.edu may be an oncoming dragon"
Home: sct@po.cwru.edu - Unknown

Date: Sat, 13 Nov 1993 06:59:24 GMT
From: dog.ee.lbl.gov!agate!usenet.ins.cwru.edu!nshore!seastar!jjw@network.ucsd.edu
Subject: Xtal filter help.
To: ham-homebrew@ucsd.edu

I've been working on a home-built xtal filter, and have got it working. However, I'm trying to figure out how to match its input & output to the other stages.

I have made a simple bridge circuit, and it appears that the resonant impedance is about 150 ohms. Is this the impedance I need to match to? If not, how do I find the right impedance? I have a decent (60MHz) scope, DMM and a comm analyzer as well as a DDS frequency source and a counter. Is this adequate equipment to build filters, or is there something else I need?

Thanks much for all help... -->jjw@seastar.org

--

John Welch, N9JZW

Date: 19 Nov 1993 21:04:41 GMT
From: src.dec.com!crl.dec.com!nntpd.lkg.dec.com!n1bwt.enet.dec.com!
wade@decwrl.dec.com
Subject: Yes, someone has built a T2 and R2
To: ham-homebrew@ucsd.edu

>Article 1121 of rec.radio.amateur.homebrew:
>Newsgroups: rec.radio.amateur.homebrew
>From: galen@picea.CFNR.ColoState.EDU (Galen Watts)
>Subject: Re: single sideband, phasing and T2/R2
>
>In the April, 93 issue of QST is the 'Multimode Phasing Exciter' alias the
>T2 board. Uses 1% componenets in the phase shift network. I have the board
>(along with the companion R2) but I haven't built it, as I can't decide if
>I should put it on 440 SSB or 1750m CW/SSB. You must also have a 90 deg.
>phase shift for the RF, which I can get for 440 from Mini-Circuits.
>
>Anybody built these boards and willing to talk?
>
>Galen, KF0YJ

Yes. After hearing Rick Campbell describe these rigs at Microwave Update '92, we decided to try them. (We are N1EKV, KB1VC, and myself). By the time the boards actually arrived, we had thought about this for awhile and discovered some potential improvements, particularly to the R2, so we decided to assemble two pairs, one to try modifications and one original design for comparison. Due to a few other activities, like other ham interests, working for a living, and trying to stay married, we aren't finished yet, but here is where we are:

T2 - works pretty well. At 50 MHz with a decent 90 degree phase shift network, I measure 55 dB of carrier suppression, and better sideband rejection than my spectrum analyzer can measure (spectrum analyzers don't have steep-skirted filters so they can sweep at a reasonable speed). Two areas need improvement:

1. The 90 degree phase shift networks in the article don't work very well. A quarter-wave of coax is good at one frequency, but too big at LF and too critical at UHF. Fast flip-flops seem attractive, but, as KH6CP has already pointed out, when you do the numbers, they aren't good enough at any reasonable frequency.

However, ferrites can do it. N1EKV came up with something called a twisted-wire quadrature hybrid using a ferrite core and a capacitor or two. I made examples for 7 Mhz and 50 MHZ - both are

within 1 degree of 90 over nearly an octave. Byron also shows an op-amp circuit which can trim both amplitude and phase. (Reference: Byron Blanchard, N1EKV, "RF Phase Shifter for Phasing-Type SSB Rigs," _Proceedings of the 19th Eastern VHF/UHF Conference_, ARRL, 1993).

The audio phase shifter is pretty good. One of the references in the QST article does a pretty thorough tolerance analysis which concludes that 30 dB of sideband suppression is easy, 40 dB is realizable, and 50 dB is hard.

2. The output low pass filter values suggested are for a Butterworth filter with cutoff at the operating frequency, so they have 3dB of loss. Look up Tchebychev filters in the ARRL handbook - you can get better harmonic rejection with minimal loss.

The R2 has much more potential for enhancement. The original works quite well, though I don't have accurate numbers. Sideband rejection might be 35 or 40 dB by rough measurement, but, to the ear, that is a lot when there is no AGC trying to counteract the filter as you tune. Areas for improvement, still under investigation:

1. Phase shifter - like T2, plus add op-amp trimmer to improve rejection.
2. High level mixers - burn some power in the local oscillator for increased dynamic range.
3. Audio preamp - currently a common-base transistor, distorts before either the mixer or the op-amps. A very low noise op amp sells for around \$5, should do a much better job and provide a better impedance for the triplexer or diplexer.
4. Triplexer - input to the audio phase shifter must be band-limited, since the phase shift is only good over a limited range. At the same time, the mixer needs a good load from DC to several times the RF frequency. We think this can be simplified to a diplexer if the audio preamp has controlled input impedance down to DC. The diplexer should have less phase distortion.
5. AGC - while we agree with Rick that AGC is terrible if one wants low distortion, the idea of a completely linear receiver with a one-watt or more audio amp driving headphones is frightening! Something to protect the ears is needed.

Teasers:

1. Is it possible for hams to make a synthesizer with low enough phase noise to use with the T2 and R2?

2. If the R2 uses a diplexer which is good down to DC, it is possible to recover both amplitude and phase of an incoming carrier. Much more than just a receiver.

paul N1BWT

Date: Wed, 17 Nov 1993 08:44:28 GMT

From: agate!howland.reston.ans.net!cs.utexas.edu!swrinde!emory!kd4nc!ke4zv!
gary@ames.arpa

To: ham-homebrew@ucsd.edu

References <2c4lhr\$6pi@hpscit.sc.hp.com>, <1993Nov15.164550.18931@cs.rit.edu>,
<2c8ohb\$abo@hpscit.sc.hp.com>

Reply-To : gary@ke4zv.atl.ga.us (Gary Coffman)

Subject : Re: single sideband

In article <2c8ohb\$abo@hpscit.sc.hp.com> rkarlqu@scd.hp.com (Richard Karlquist) writes:

>In article <1993Nov15.164550.18931@cs.rit.edu>,

>Albert T Davis <atd@cs.rit.edu> wrote:

>>

>>This is why they abandoned the phasing method back in the days of tubes.

>>It was all true then. It was difficult to get even 20 db or so of

>>carrier and alt sideband suppression. Even discrete transistor circuits

>>are probably not good enough here. How much carrier suppression is

>>required? It seems to me that today's IC's should be able to do it.

>

>Regarding IC's as balanced modulators: "today's" IC's (i.e. MPY600)

>are not necessarily any better than 1970's IC's (i.e. MC1496) in terms

>of balance. They just run at higher frequencies. Probably the best

>that can be hoped for is internally trimmed IC's. This is better than

>a 1496 w/o external trimming, but not as good as an externally tweaked

>1496. The other problem with Gilbert cell IC's is that to get good

>IMD, you have to operate them at very low levels. This exacerbates

>the carrier suppression problem because the signal is small compared

>to the carrier. Since Gilbert cells have high noise levels, dynamic

>range is a big problem.

Of course there was a solution back in vacuum tube days. It was called a 7360. This was a high level beam deflection mixer used in SSB transmitters. The problem of getting a precise 90 degree phase shift across three octaves of audio remained, however, with the B&W Mod 350 2Q4 network only good for +/- 1.5 degrees across the bandpass. That only gave about 40 db of opposite sideband rejection, but carrier suppression was easily 60 db.

Gary

--

Gary Coffman KE4ZV	If you wanna run cool,	gatech!wa4mei!ke4zv!gary
Destructive Testing Systems	you gotta run on heavy,	uunet!rsiatl!ke4zv!gary
534 Shannon Way	heavy fuel.	emory!kd4nc!ke4zv!gary
Lawrenceville, GA 30244	-Mark Knoffler	

End of Ham-Homebrew Digest V93 #108
